Saint Paul's Sanitary Sewer System

Water Chapter Task Force
September 10, 2007

Saint Paul Sewer Utility
Aaron Hass
Anne Weber

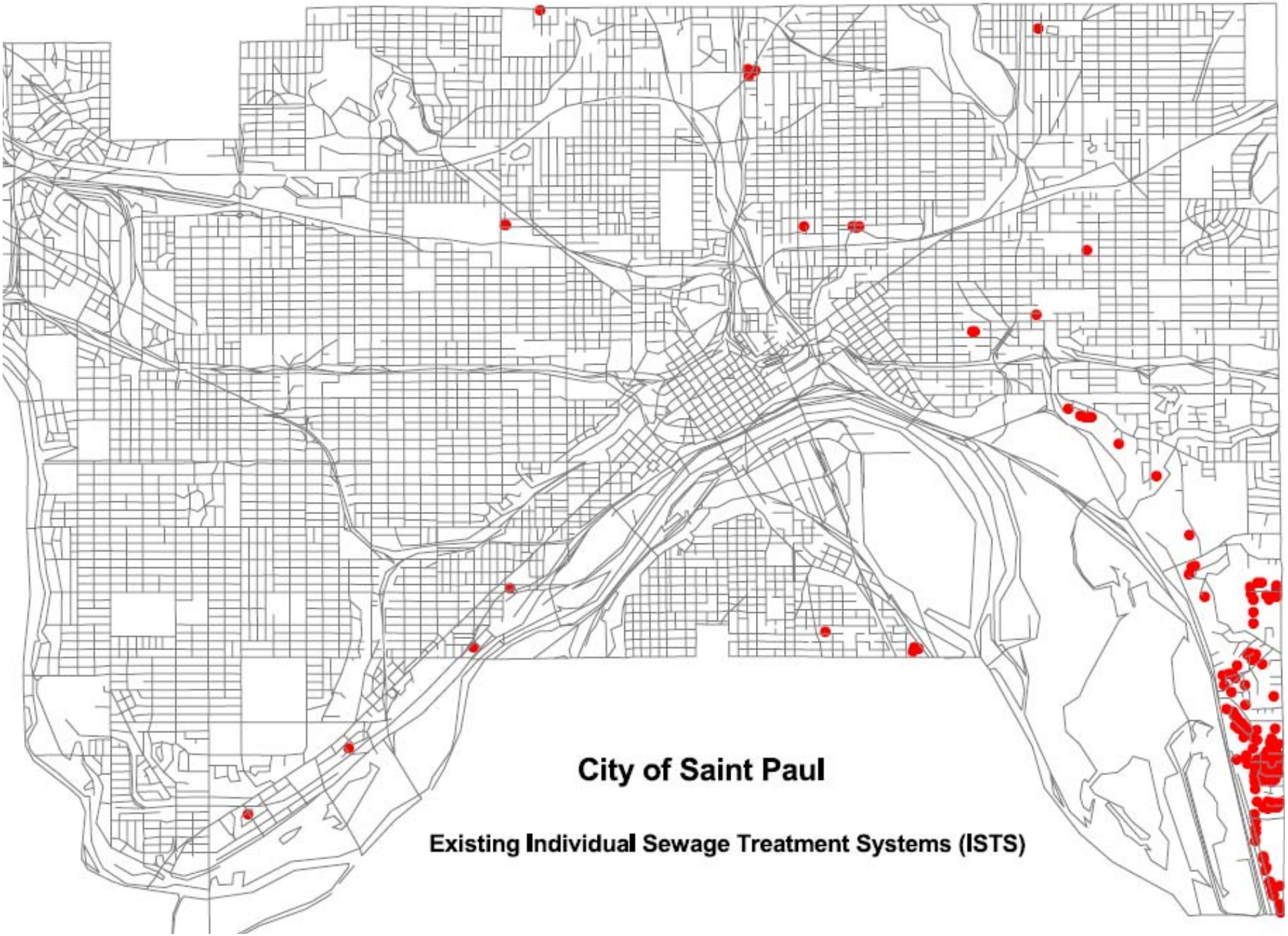
- **Met Council Water Chapter Requirements**
- **Saint Paul’s Sanitary Sewer System**
- **Inflow and Infiltration Reduction Program**

Met Council Water Chapter Requirements

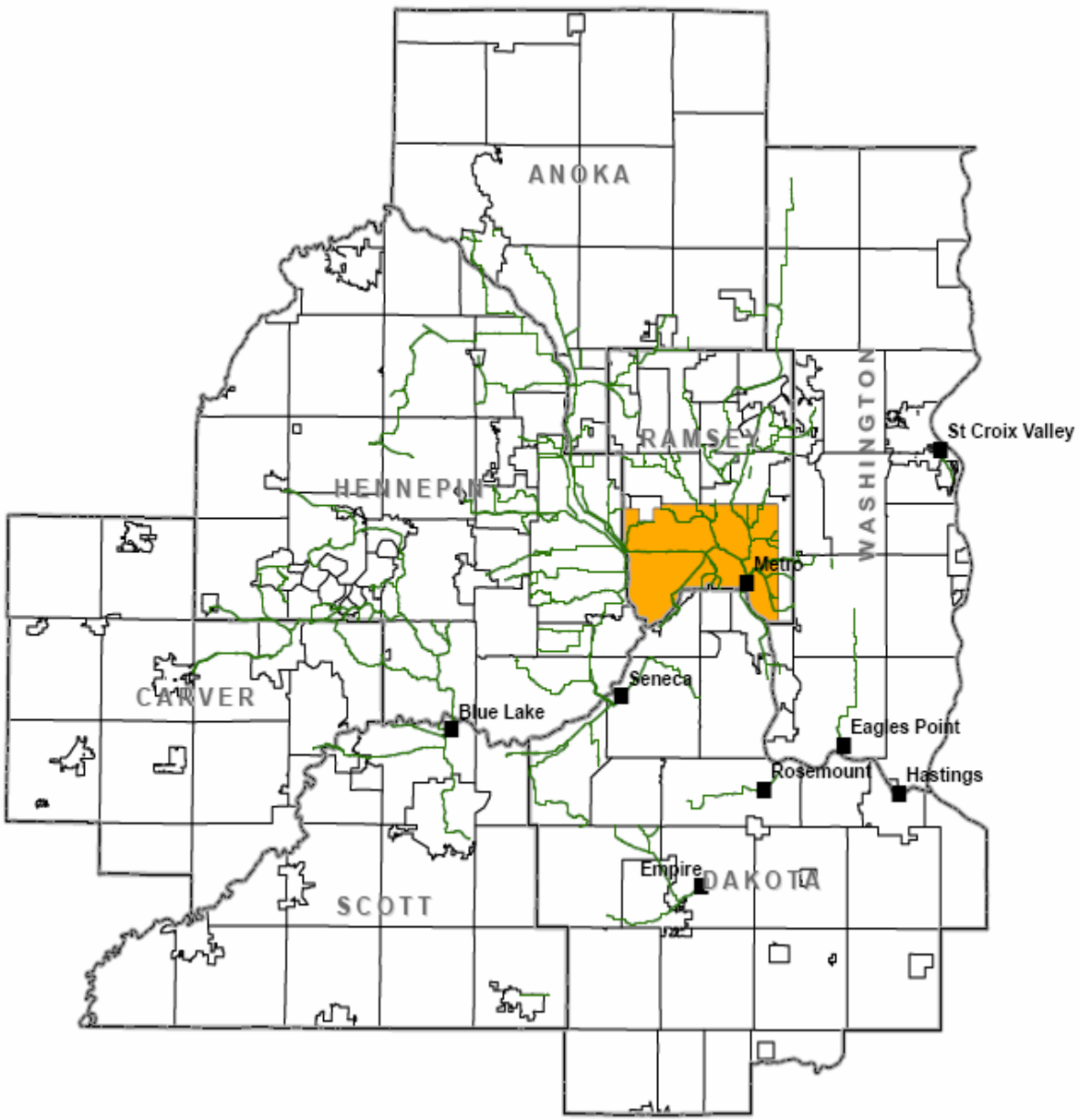
- **Adopted community forecasts of households and employment thru 2030.**
- **Map showing the sanitary system including lift stations, waste disposal sites and existing connections points to the MDS.**
- **Inter-community connections.**
- **Location of private wastewater treatment plants.**
- **Capacity and design flows for existing trunk sewers and lift stations.**
- **City goals, policies and strategies for preventing and reducing excessive infiltration and inflow (I/I) in their sewer system.**

Met Council's Forecasts for the City of Saint Paul

	2010	2020	2030
Population	305,000	320,000	331,000
Households	120,000	127,000	133,000
Employment	196,000	210,000	220,600
Wastewater Flow (mgd)	30.63	31.23	31.46


City of Saint Paul
Existing Individual Sewage Treatment Systems (ISTS)

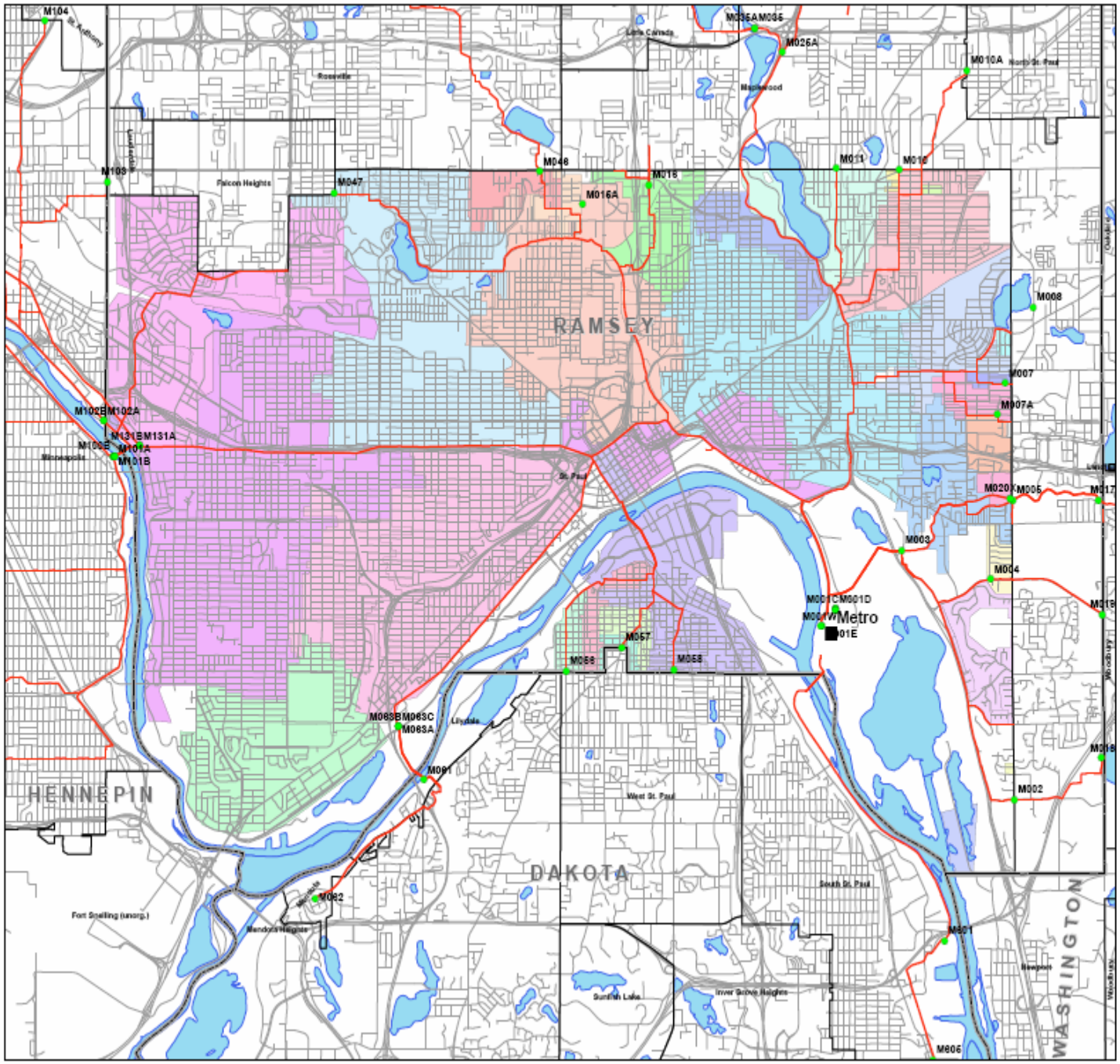
Regional Facilities in the Metropolitan Area



MCES Treatment Plant
MCES Interceptor
County Boundary
Community Boundary

N

7 3.5 0 7 Miles



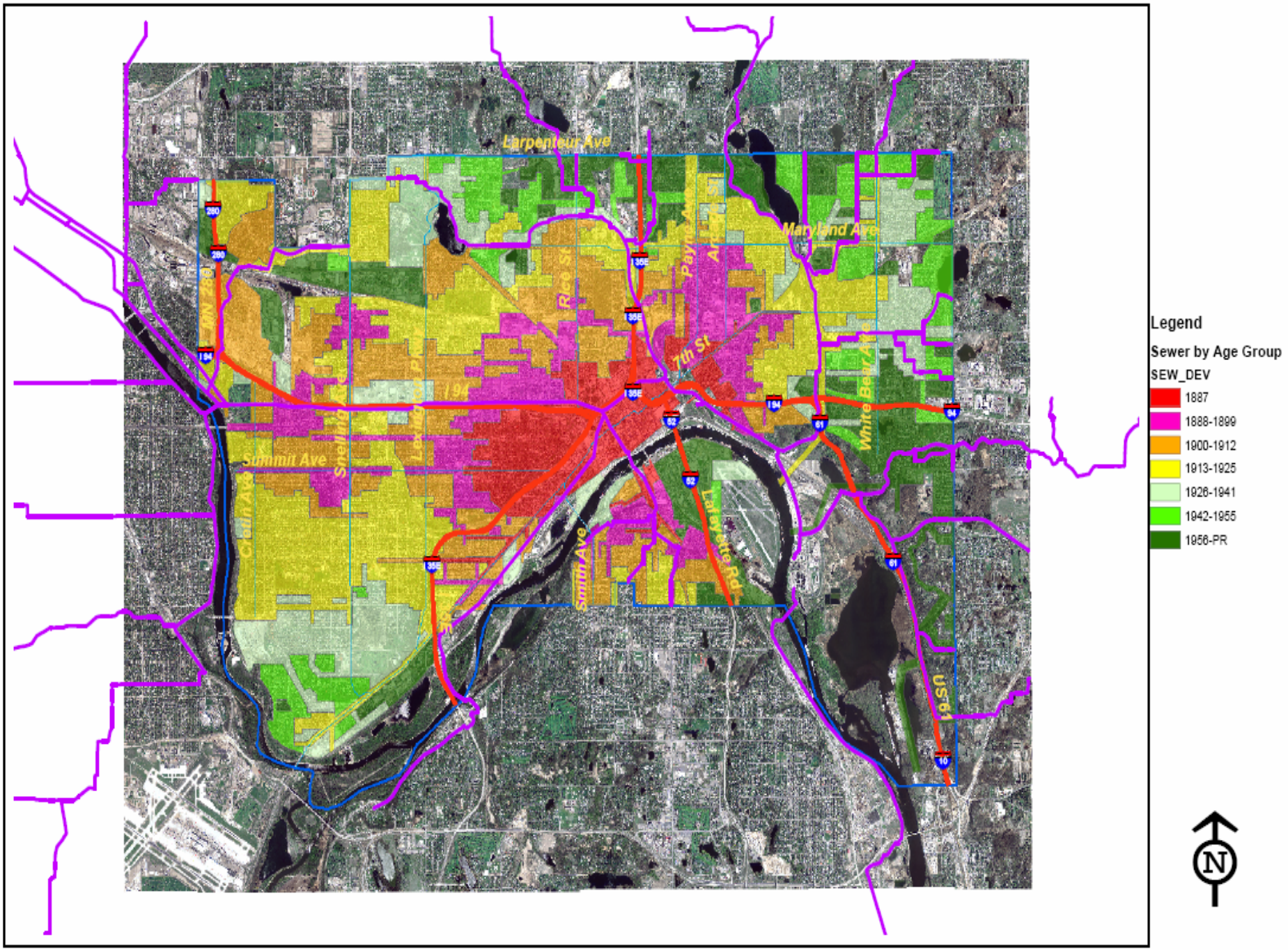
Regional Facilities in St. Paul

- MCES Flow Meters
- MCES Treatment Plant
- MCES Interceptor
- County Boundary
- Community Boundary
- Roads
- Lakes and Rivers

N

1 inch equals 1 miles

City of Saint Paul - Sewer by Age group



Sewer Inspection Program

- City operates 804 miles of sanitary sewer and 23 sanitary sewage pumping stations.

- Since the first 10-year cycle began in 2004, 35 % of City's sanitary sewers have been cleaned and inspected.

- 100 miles of sewers inspected annually
  - 80 miles of sanitary sewers through Programmed Sewer Inspection
  - 15 miles of storm and sanitary sewers through RSVP
  - 5 miles of sanitary and storm sewers through complaints

City of Saint Paul
25 West Fourth Street
Saint Paul, Minnesota, 55102
Tel: 651-266-6234, Fax: 651-298-5621

INSPECTION REPORT

DATE:	WORK #:	WEATHER:	OPERATOR:	SECTION NR:	SECTION NAME:
10/27/2005	05-0001A	City of St Paul	Dobber Stott	689	TV
PRESENT:	**VEHICLE:**	**CAMERA:**	**PRESET:**	**CLEANED:**	**RATE:**
2005	2669	PAN TILT		JET CLEANED	6

STREET:	JEFFERSON	MAP #1:		MH:	SNM-119762
CITY:	PRIOR / KENNETH	MAP #2:	SNP-119765	MH:	SNM-119764
LOCALE:	MAIN RESIDENTIAL STREET	TAPE #:	D- 40	TV'D LGTH:	218.9 ft

INSPECT REASON:	PROGRAMMED	PIPE SIZE:	12
SECTION TYPE:	SANITARY	MATERIAL:	CPP JT LGTH: 219
AREA:	WEST	LINING:	RANDOLPH LEXINGTON
		RSRVD:	

REMARK:

1:500	POSITION	CODE	OBSERVATION	VCR #	PH	RATE
SNM-119762	0.00		MH I/F #1958 TO MH I/F #1980	00:00:00		
	0.00	BOU	Inspection begins at upstream manhole	00:00:00		0
	27.80	SCT	Service Connection: Tapped, at 09 o´clock OPEN AT THE MAIN	00:00:00	3613a	3
	190.10	SCT	Service Connection: Tapped, at 09 o´clock LOOKS OPEN AT THE MAIN	00:00:00	3614a	1
SNM-119764	218.90	EOD	Inspection ends at downstream manhole	00:00:00		0

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INSPECTION IMAGES

CITY:	STREET:	DATE:	SECTION NR:	SECTION NAME:
PRIOR / KENNETH	JEFFERSON	10/27/2005	689	TV

IMAGE: 3613a, TAPE #: D- 40, 00:00:00
27.8FT, Service Connection: Tapped, at 09 o´clock OPEN AT THE MAIN

IMAGE: 3614a, TAPE #: D- 40, 00:00:00
190.1FT, Service Connection: Tapped, at 09 o´clock LOOKS OPEN AT THE MAIN

Sewer Lining Program

- Since 1997, a total of 150 miles of sewer have been lined.
- 14 miles of sewer are lined annually

- An epoxy impregnated felt lining is inserted into the sewer. Water pressure pushes the liner the entire length of the sewer. The water is then boiled to cure and harden the liner. A robotic cutter is used to open lateral connections.

Rates, Billing and Collections

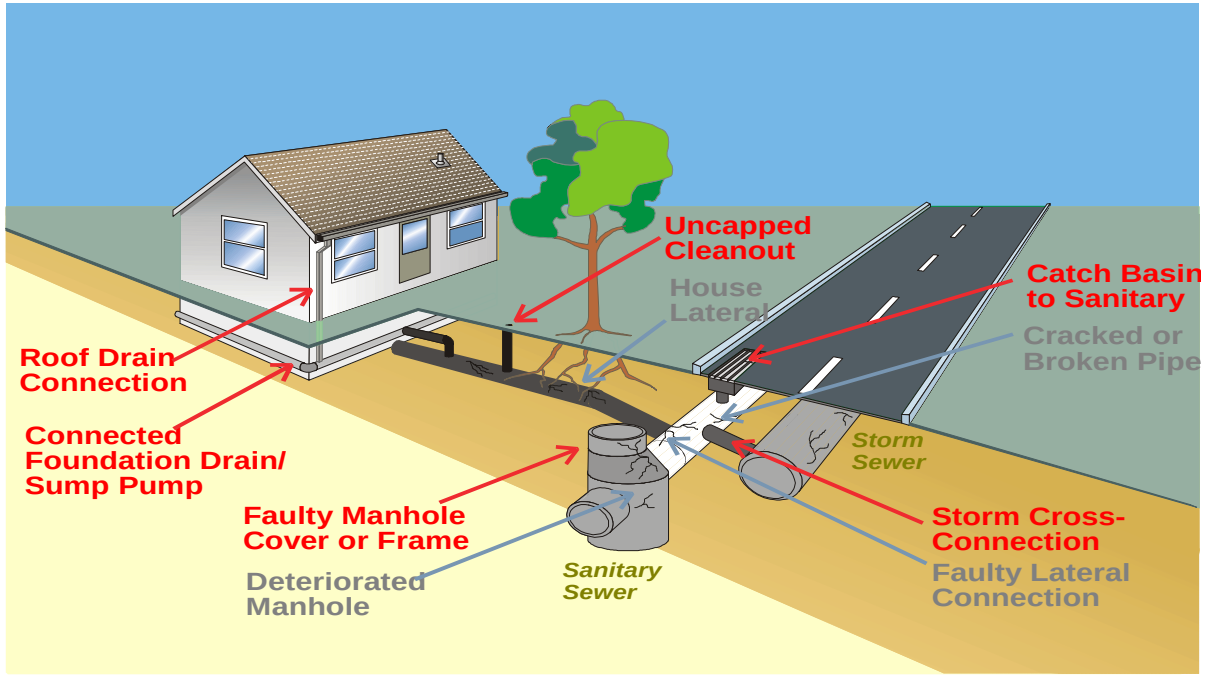
- Sanitary sewer charges are based on the volume of sewage discharged into the Sewer System measured by the volume of water used and are established annually.

- Approximately 70,017 residential customers contribute 52% of the Sewer System's flow. The remaining 48% comes from approximately 3,168 commercial, industrial or institutional customers.

- The Sewer Utility Enterprise Fund does not receive a budgetary allocation from the City's General Fund.

What is Inflow and Infiltration (I&I)?

- **Inflow** is typically rain water that enters publicly owned sewer and manholes, as well as through private property sources such as rain leaders, sump pumps, foundation drains, and leaking house services.
- **Infiltration** is typically the seepage of groundwater into the sanitary sewer system through cracks or joints of manholes and pipes; and leaking house services.



Why is I&I a problem?

Health and Safety Issues

- Excess I&I can negatively impact treatment process and capacity.
- Increases the risk of a sewer pipe collapse, sinkhole or surface depression (2006 -approximately 75 sinkholes/depressions were identified in St. Paul).

Infrastructure and equipment wear and tear

Metropolitan Council Environmental Services (MCES) Surcharge Program (Adopted in February, 2006)

- If excess I&I is not removed MCES has the authority to increase wastewater treatment costs that are passed on to users through sanitation fees.

I&I Reduction Programs in Saint Paul (past and present)

Combined Sewer Separation Program (CSSP)

- Largely completed from 1986 to 1996.
- Main goal was to eliminate the discharge of untreated combined sewage overflow into the Mississippi River.
- Successfully completed with the collaborative efforts of people from both the public and private sectors.
- City, State, and Federally funded program that cost over $400 million. Saint Paul is one of the few cities of its size in the nation to have completed a sewer separation program.

Rain Leader Disconnect Program

- Enforced in 1986 and continues today (Section 41.03 of the City's code)
- Requires property owners to disconnect rain leaders from the sanitary sewer system.

Sewer Lining Program

- In recent years approximately $3 to $4 million dollars/ year is spent on lining sewers to reduce I/I and extend sewer pipe service life.

Why take Additional Action Now?

Metropolitan Council Environmental Services (MCES) adopted a new policy:

- The Metropolitan Council will establish I/I goals for all communities discharging wastewater to the Metropolitan Disposal System (MDS).
- Communities that have excessive I/I in their sanitary sewer systems will be required to eliminate the excessive I/I within a reasonable time period (generally 5 years).
- The Metropolitan Council will not provide additional capacity within its interceptor system to serve excessive I/I.
- **MCES's policy and it's Surcharge Program was adopted by the Metropolitan Council in February, 2006**

Why take Additional Action Now?

MCES Surcharge Program

- MCES develops the I/I goals and limitations for each community it serves. In 2006 MCES initially identified 56 communities as having exceeded their I/I allowance, including Saint Paul and Minneapolis (surcharge list).

- Communities on the "surcharge list" generally have 5 years to remove their excess I/I. If not removed within that 5 year period MCES may charge communities an additional wastewater demand charge (annual surcharge amount).

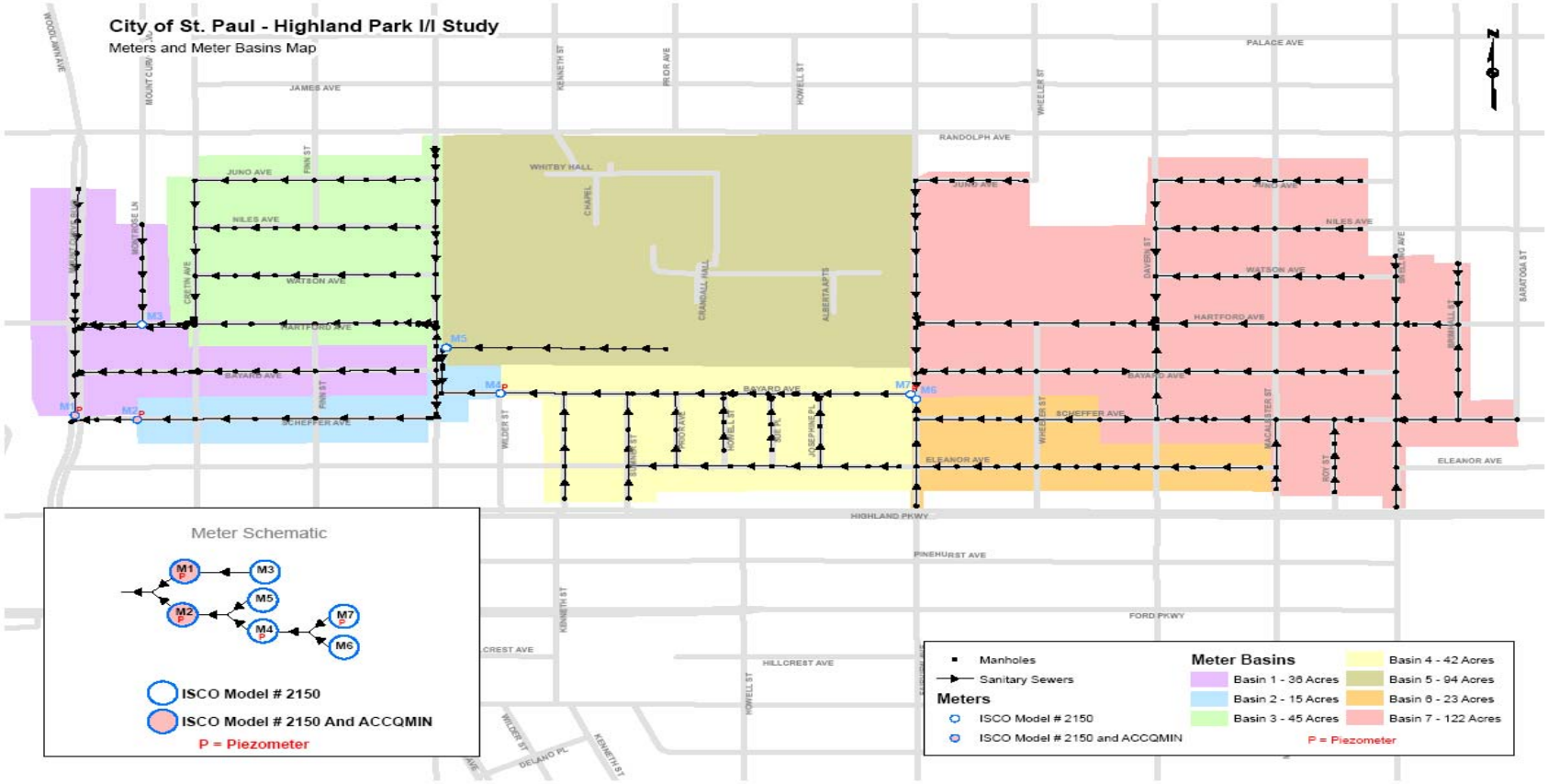
- MCES has set Saint Paul's annual surcharge amount at $6 million/year (corresponds to an excess I/I flow of 85 MGD).

- Saint Paul is eligible to have it's annual surcharge reduced to $3.5 million/year and time period extended through 2015. MCES has made this contingent upon Saint Paul completing and submitting an engineering study and report to MCES (I/I Pilot Study).

- MCES has authority to annually adjust the peak flows/ surcharge amount for each community.

Saint Paul “I/I Pilot Study”

In 2006 the Saint Paul Public Works Sewer Utility began an “I/I Pilot Study” in the Highland Park neighborhood surrounding the College of Saint Catherine.



BROWN AND CALDWELL
Environmental Engineers & Consultants

SEH

Responsive Services • Quality Facilities • Employee Pride
SAINT PAUL PUBLIC WORKS

Saint Paul "I/I Pilot Study"

Activities Include

- Flow and Rainfall Monitoring (2006 and 2007)
- Rain Leader windshield survey
- Smoke Testing
- Modeling of "dry" and "wet" weather flows (exist./ proposed conditions).
- Solutions Analyses (costs, impacts)
- Develop Plan for Future I/I Abatement Work

Schedule

- Smoke Testing, June 11 to June 29 (approximate)
- Study Completion, Fall of 2007

Preliminary Results

- **Flow monitoring data collected thus far indicates some Inflow and Infiltration is occurring within the Pilot Study area (including meter basin 7).**

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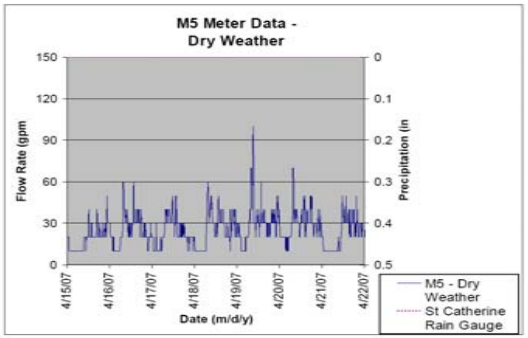
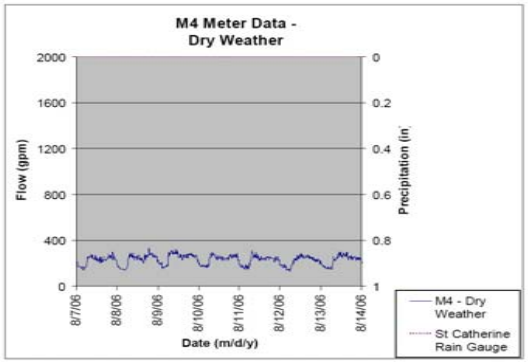
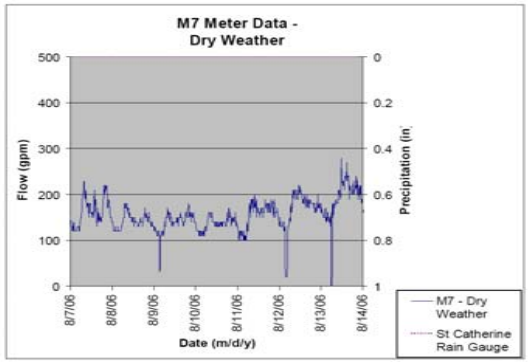
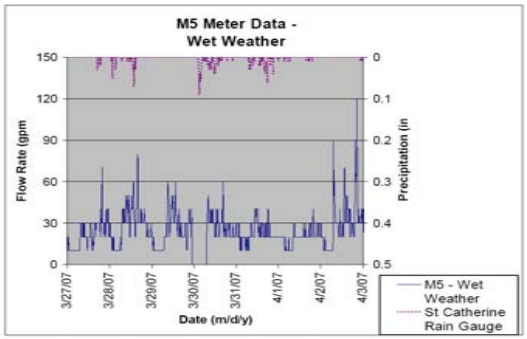
SAINT PAUL PUBLIC WORKS

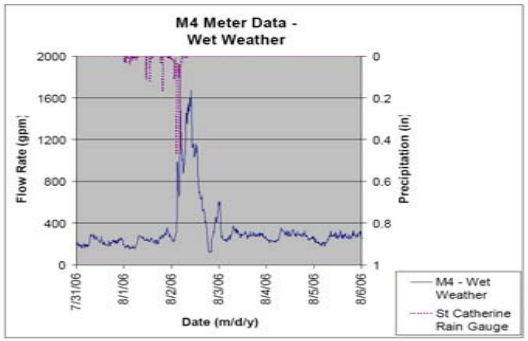
Saint Paul “I/I Pilot Study”
“Dry” vs. “Wet” Weather Flows

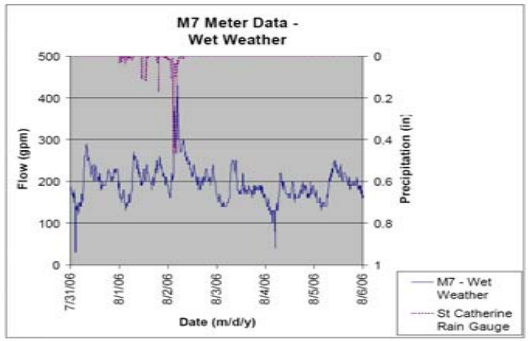








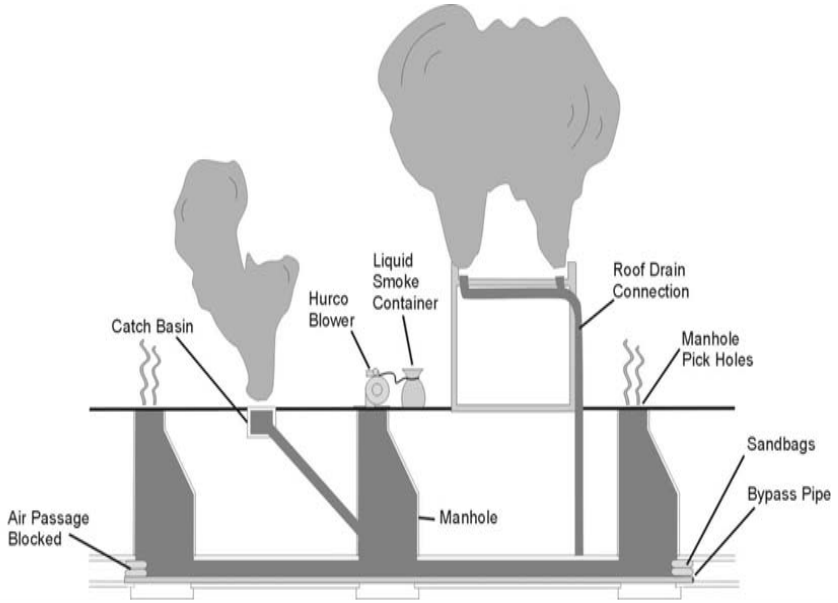




Saint Paul "I/I Pilot Study" – Smoke Testing

Smoke Testing - Purpose

- ☑ Locate Inflow Sources
- ☑ Locate Infiltration Sources
- ☑ Verify System Connectivity for Modelir
- ☑ Verify Flow Routing & Basin Boundarie
- ☑ Identify Storm Drain Cross Connectior
- ☑ Locate Illicit Connections
- ☑ Identify Abandoned Connections
- ☑ Regain System Capacity



Smoke Testing – Benefits to Property Owners

- Help identify plumbing defects which can also allow potentially harmful sewer gases to enter a home.

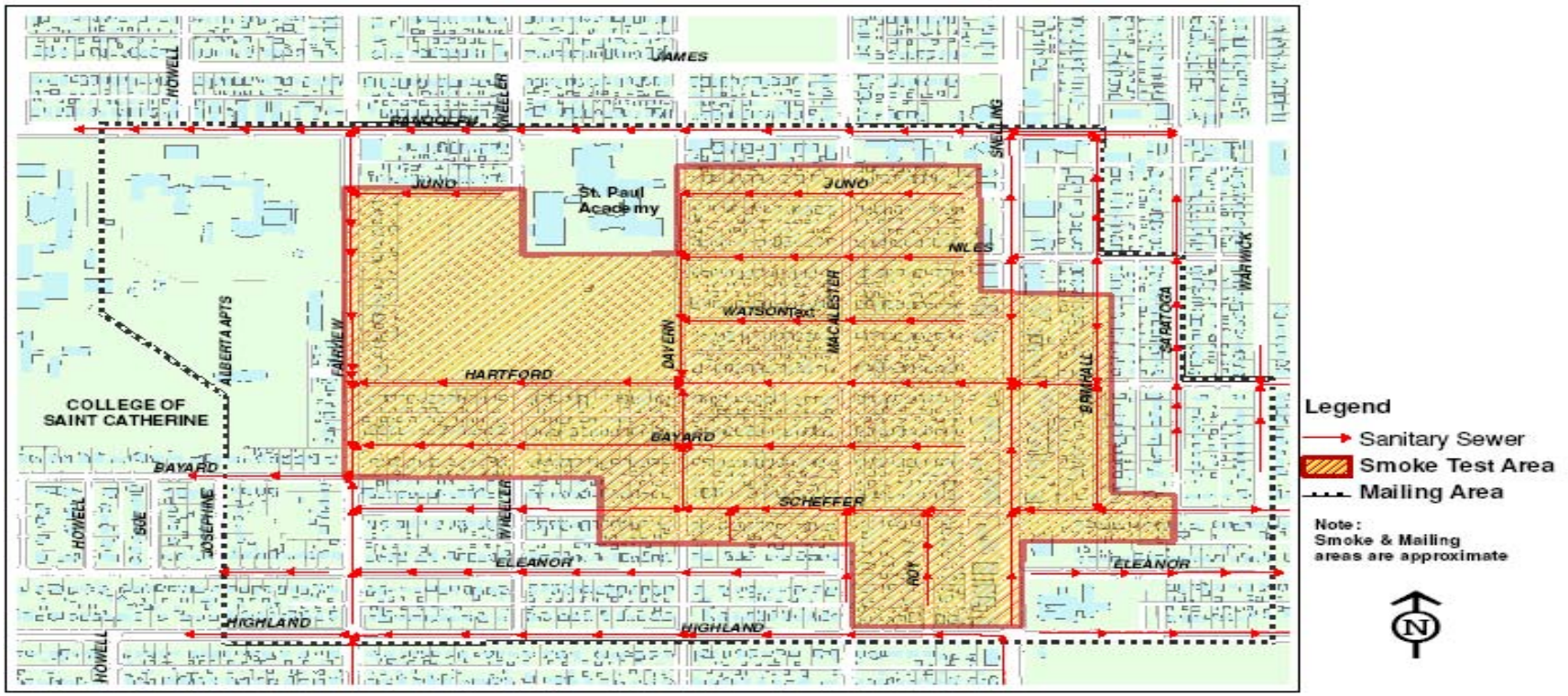
- Help the City prepare a comprehensive I/I Abatement plan to reduce excess I/I and in turn reduce the risk of MCES passing increased treatment costs on to users (City and property owners).

Smoke Testing – Project Area & Schedule

Anticipated Schedule (approx.):

Week of June 11th – SPA area and streets north of Hartford Street
Week of June 18th – Fairview Ave, Hartford Street and areas south
Week of June 25th – Complete the balance of smoke testing work

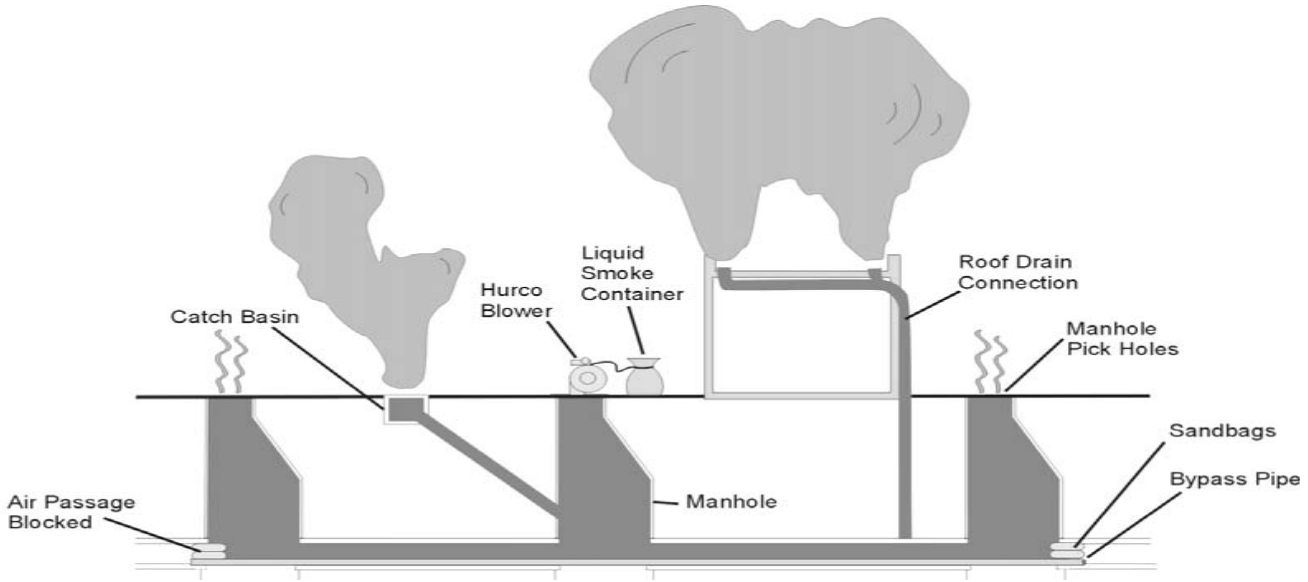
Smoke Testing Area
(Part of St. Paul's I/I Pilot Study)



Smoke Testing

Process

- Simulated smoke will be injected into the sewer system. As a result smoke may be seen coming from manhole covers, storm drains, roof vents, and building foundations.
- After each setup the smoke test will last approximately 30 minutes.
- Photographs will be taken to document potential leaks.
- Homeowners do not need to be home and inspection crews will not need to enter your home.
- Residents/Homeowners can still use faucets and bathroom facilities



Smoke Testing Process

- Force Air Into System
- Introduce Smoke
- Observe Where Smoke Escapes

Smoke Testing Equipment

High Volume Air Blower

- Typically 1,500 to 3,000 cfm, desired

Type Smoke Material Used

MATERIAL SAFETY DATA SHEET for HURCO TECHNOLOGIES, INC.

LiquiSmoke™

SECTION I
Product Identification

TRADE NAME:

Hurco LiquiSmoke™

GENERAL OR GENERIC ID: Hydrotreated Middle Distillate
DOT HAZARD CLASSIFICATION: N/A
CHEMICAL FORMULA: Proprietary

This material is in compliance with the Toxic Substances Control Act (15 USC 2601—2629).

SECTION II
Composition, Information on Ingredients

INGREDIENT: Hydrotreated Middle Distillate
CAS #: 64742-46-7
PERCENT: 100

EXPOSURE INFORMATION

Ingredients	ACGIH TLV	STEL	OSHA Pel	STEL
Hydrotreated Middle Distillate	100 mg/m3	NA	NA	

Exposure limits expressed as 8-hour TWA concentrations in either parts per million (ppm), or milligrams per cubic meter (mg/m3).

SECTION III
Hazards Identification

ROUTES OF ENTRY

Inhalation: Yes
Skin: Yes
Ingestion: Yes

EXPOSURE EFFECTS

Symptoms of Exposure: Headache, drowsiness, eye, respiratory or skin irritation, nausea, numbness.
Acute Exposure Effects: Ingestion may cause nausea, vomiting and diarrhea.
Chronic Exposure Effects: Dermatitis, pneumonitis & pulmonary edema.

MEDICAL CONDITION

Aggravated by Exposure: NA
Carcinogen Status: No
NTP: No
OSHA No
IARC: No

CARCINOGENICITY STMT: According to IARC Monographs, severely hydrotreated oils, such as this product, are not considered carcinogenic. Nevertheless, good industrial hygienic practices are recommended.

SECTION IV
First Aid Measures

Emergency and First Aid Procedures

Remove from contaminated atmosphere. Give artificial respiration if not breathing. Remove contaminated clothing. Thoroughly wash affected areas with soap and water. In case of eye contact, flush eyes with water for 10-15 minutes. SEEK IMMEDIATE MEDICAL CARE.

If swallowed, DO NOT INDUCE VOMITING.

SECTION V
Fire and Explosion Data

Flashpoint: 265°F (129.43°C) COC
Autoignition Temperature: NA
LEL: NA
UEL: NA
Fire Fighting Procedures: SCBA may be required.
Extinguishing Media: CO2, Dry Chemical, Foam
Unusual Fire & Explosion Hazards: Water may cause frothing.

SECTION VI
Accidental Release Measures

SPILL/RELEASE INSTRUCTIONS

Eliminate all sources of ignition. Contain with earthen like or petroleum absorbent material. Remove with grounded suction pump to salvage container. Remove all contaminated materials.

SECTION VII
Handling & Storage Information

Keep away from all ignition sources (e.g. heat, flame, sparks, strong oxidizers). Bond and ground container.

SECTION VIII
Exposure Controls/Personal Protection

Engineering Controls: No
Local Exhaust: To control vapors.
Mechanical Ventilation: For Confined Spaces.
Respiratory Protection: NIOSH approved organic vapor respirator.
Eye Protection: Chemical goggles or face shield.
Glove Protection: PVC/equivalent resistant glove.
Work/Hygienic Practices: Always minimize body contact. Wash areas of body contact promptly. Use a PVC/equivalent resistant apron where splash potential exists.

SECTION IX
Physical & Chemical Properties

Physical Appearance: Water white liquid
Product Odor: Negligible
Specific Gravity <1
Solubility in Water Insoluble
Boiling Point 470°F 243.31°C
Freezing Point (F): NA
Melting Point (F): 30°F -1.11°C
Vapor Pressure: <0.1
Reference: mmHg@70°F

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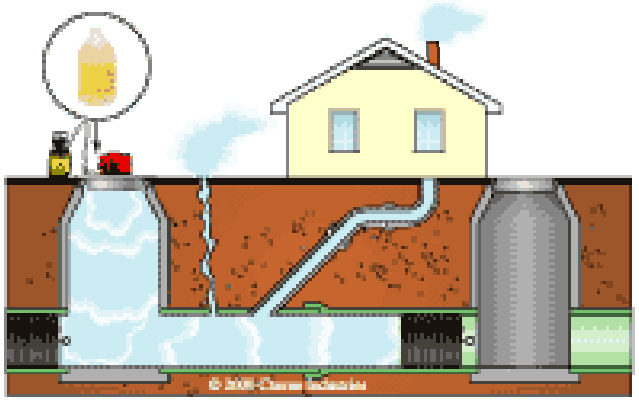
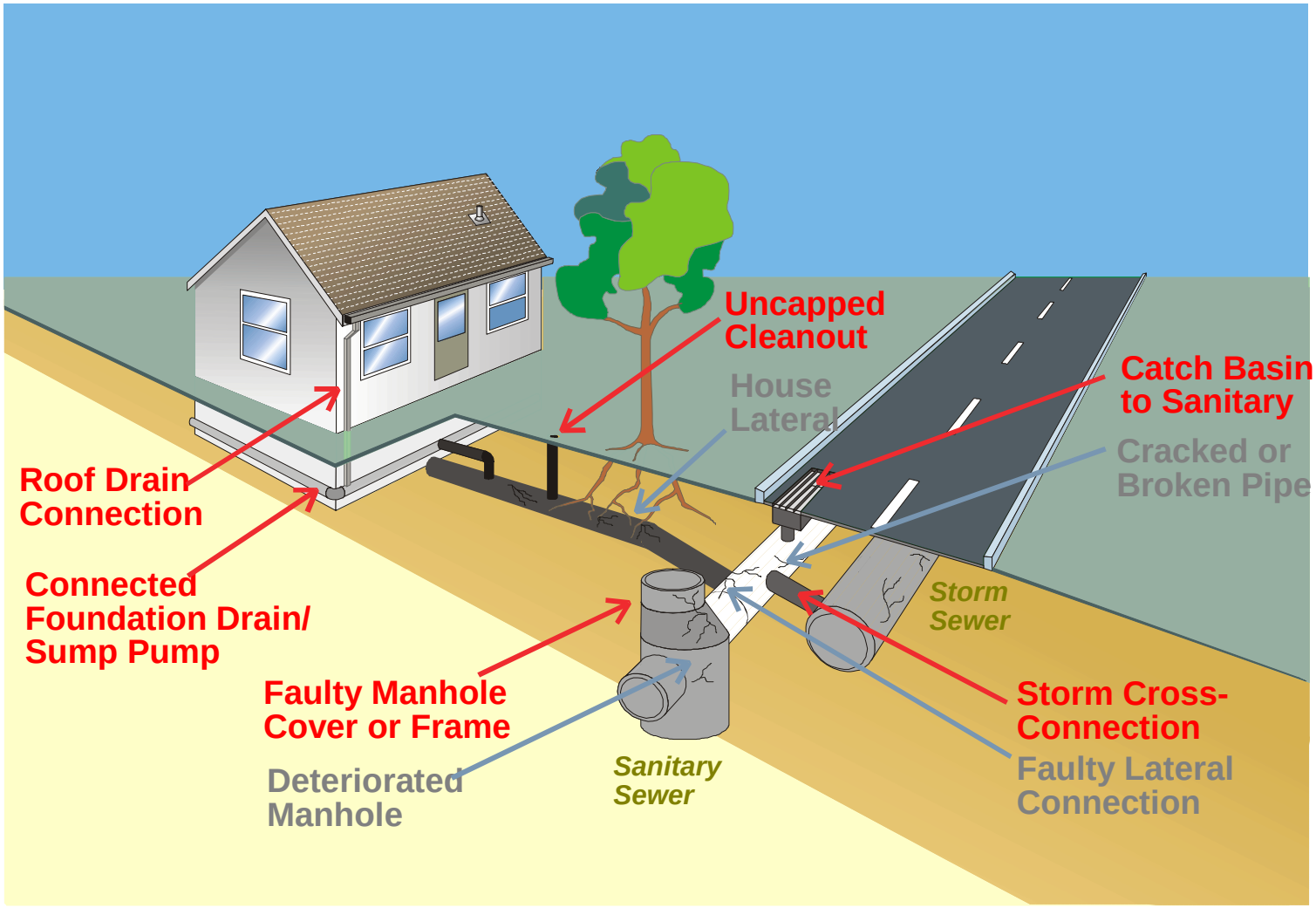
Liquid Smoke



Infiltration & Inflow Sources



Manhole Defects Identified

Leaky Laterals are Identified

Illicit Storm Drain Roof Leaders Located

Storm Drain Cross Connections Located